CLAIMS

1. An ink-jettable composition, comprising a palladium aliphatic amine complex solvated in a liquid vehicle.

2. The composition of claim 1, wherein the aliphatic amine is selected from the group consisting of diamine alkanes, triamine alkanes, and mixtures thereof.

3. The composition of claim 1, wherein the aliphatic amine is a primary amine.

4. The composition of claim 2, wherein the aliphatic amine is selected from the group consisting of 1,2-diaminopropane, 1,3-diaminopropane, diethylenetriamine, 1,4-diaminobutane, 1,6-diaminohexane, N,N'-dimethyl-1,3-propanediamine, N,N,N',N'-tetramethylethylenediamine, 2-hydroxy-1,3-diaminopropane, and mixtures thereof.

5. The composition of claim 4, wherein the aliphatic amine is 1,2-diaminopropane.

6. The composition of claim 1, further comprising a counter ion associated with the palladium aliphatic amine complex, said counter ion being a member selected from the group consisting of acetate, halide, sulfate, and mixtures thereof.

7. The composition of claim 1, wherein there is non-complexed amine present in the liquid vehicle.

8. The composition of claim 1, wherein the palladium aliphatic amine complex is present in the ink-jettable composition at from about 2 wt% to about 38 wt%.

9. A method of forming an electrically conductive pathway, comprising steps of:

a) jetting a first ink-jettable composition onto a substrate in a predetermined pattern, said first composition including a first liquid vehicle and a palladium aliphatic amine complex solvated therein;

b) applying a second composition to at least a portion of the predetermined pattern, said second composition including a second liquid vehicle and reducing agent solvated therein; and

c) applying heat to the predetermined pattern sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate.

10. The method of claim 9, further comprising depositing a conductive metal onto the palladium metal.

11. The method of claim 10, wherein the conductive metal is selected from the group consisting of copper, gold, palladium, nickel, silver, rhodium, platinum, Co-Fe-B, Co-Ni-P, Co-Ni-Fe-B, Ni-Co, and mixtures or alloys thereof.

12. The method of claim 10, wherein the step of depositing is an electroless deposition process.

13. The method of claim 10, wherein the predetermined pattern is a non-continuous pattern of palladium aliphatic amine complex which, once reduced, is a seed for deposition of the conductive metal.

14. The method of claim 9, wherein the second composition is underprinted with respect to the first ink-jettable composition.

15. The method of claim 9, wherein the second composition is overprinted with respect to the first ink-jettable composition.

16. The method of claim 9, wherein the aliphatic amine of the palladium aliphatic amine complex is selected from the group consisting of diamine alkanes, triamine alkanes, and mixtures thereof.

17. The method of claim 16, wherein the aliphatic amine is 1,2-diaminopropane.

18. The method of claim 9, wherein the substrate comprises a member selected from the group consisting of ceramics, polymers, cellulose, silicon, and mixtures thereof.

19. The method of claim 9, wherein the step of applying the second composition is by ink-jetting, said second composition being ink-jettable.

20. The method of claim 9, wherein the second composition further comprises a colorant.

21. The method of claim 9, wherein the first composition further comprises a colorant.

22. The method of claim 9, wherein the reducing agent is selected from the group consisting of formic acid, esters of formic acid, formic acid derivatives, hydrazine, alkali metal borohydride, oxalic acid, alkali or alkaline earth sulfites, and mixtures thereof.

23. The method of claim 22, wherein the reducing agent is formic acid.

24. The method of claim 9, wherein the step of applying heat occurs at from about 50° C to about 80° C.

25. The method of claim 9, wherein the predetermined pattern is a circuit.

26. A substrate having a circuit formed thereon, said circuit prepared by the method of claim 9.

27. A substrate having a circuit formed thereon, said circuit prepared by the method of claim 10.

28. A system for forming electrically conductive pathways on a substrate, comprising:

a) a first printhead having a first firing chamber reservoir containing a first ink-jettable composition, said first ink-jettable composition including a first liquid vehicle and a palladium aliphatic amine complex solvated therein;

b) a second printhead having a second firing chamber reservoir containing a second ink-jettable composition, said second ink-jettable composition including a second liquid vehicle and a reducing agent solvated therein, said second printhead being configured to overprint, underprint, or simultaneously print the second ink-jettable composition on a substrate with respect to the first ink-jettable composition; and

c) a heating apparatus configured to be in thermal contact with the substrate.

29. The system of claim 28, wherein the aliphatic amine is selected from the group consisting of diamine alkanes, triamine alkanes, and mixtures thereof.

30. The system of claim 29, wherein the aliphatic amine is selected from the group consisting of 1,2-diaminopropane, 1,3-diaminopropane, diethylenetriamine, 1,4-diaminobutane, 1,6-diaminohexane, N,N'-dimethyl-1,3-propanediamine, N,N,N',N'-tetramethylethylenediamine, 2-hydroxy-1,3-diaminopropane, and mixtures thereof.

31. The system of claim 30, wherein the aliphatic amine is 1,2-diaminopropane.

32. The system of claim 28, wherein the reducing agent is selected from the group consisting of formic acid, esters of formic acid, formic acid derivatives, hydrazine, alkali metal borohydride, oxalic acid, alkali or alkaline earth sulfites, and mixtures thereof.

33. The system of claim 32, wherein the reducing agent is formic acid.

34. The system of claim 28, further comprising an electroless deposition apparatus for depositing a conductive metal on the substrate once reduction of the aliphatic amine complex occurs.